

# Preliminary Observations on the Feeding Behavior of *Conus purpurascens* BRODERIP, 1833

BY

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(Plate 4)

AT LEAST TWO SPECIES of the genus *Conus*, *Conus striatus* LINNAEUS, 1758, and *C. catus* HWASS in BRUGUIÈRE, 1792, are known to prey on living fishes (KOHN, 1956). Both are Indo-West Pacific in distribution. Until now no species of the West American *Conus* fauna has been reported in the literature as preying on fishes. This paper reports on the feeding of *C. purpurascens* BRODERIP, 1833 on fishes under captive conditions.

During the summer of 1966, while I was initiating a study of the ecology of the West American species of *Conus* in the Guaymas area of western Mexico, four specimens of *C. purpurascens*, together with representatives of 7 other West American *Conus* species, were collected and brought alive to aquaria at the Moss Landing Marine Laboratories. In an effort to maintain these specimens alive, I contacted Dr. Alan Kohn who stated, from observations of Dr. R. T. Paine, that *C. purpurascens* was a fish eater. I therefore attempted to feed local fishes to the captive specimens with the aim of studying the feeding process itself. A few preliminary results of these studies, primarily in the form of a sequence of photographs of the feeding process, have been obtained and are reported here.

## METHOD AND RESULTS

A one gallon aquarium was set up near a window in my office so that illumination would be sufficient for photography. The aquarium had a bottom substrate of sand and was filled with sea water having a temperature

near that of the large holding tank (about 22° C). Each feeding sequence was either observed and notes taken or it was the subject of a photographic record.

Only two species of fishes have as yet been used in the experiments, *Xerorpes fucorum* (JORDAN & GILBERT, 1880) and *Oligocottus snyderi* GREELEY, 1901. Both species have been taken without hesitation by all four captive specimens of *Conus purpurascens*. More species of fish are being tested.

For each observation the specimen of *Conus purpurascens* was removed from the holding tank and placed into the experimental aquarium. Shortly after placing the *Conus* in the tank a fish was netted out of the fish holding aquarium and placed into the experimental aquarium with the *Conus*.

In general the sequence of events observed in the feeding was similar to that outlined by KOHN (1956) for *Conus striatus*.

When placed into the isolation aquarium from the holding tank, *Conus purpurascens* shows little movement for several minutes. Then the siphon is extended and moved slowly around. If the animal is left alone in such circumstances, after about 10 minutes it extends out from its shell and begins to burrow down into the sand. The usual inactive position of this species in aquaria is partially or totally buried in the sand with only the siphon protruding above the surface.

If, however, a fish is introduced into the aquarium its presence is sensed by the *Conus* almost immediately. KOHN (1956) has suggested that *Conus striatus* detects the presence of fish by chemoreception using the osphradium. This would appear to be the mechanism acting in

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*Conus purpurascens* also. I tested this by adding to the *Conus* tank water taken from the fish holding tank. This prompted immediate activity on the part of two *Conus* individuals indicating use of chemoreception to sense the presence of the fish.

The animal responds to the presence of the fish by extending its proboscis (Plate 4, Figure 2). The proboscis is orange-red in color on the dorsal side and flesh color on the ventral side. The orange-red color is particularly striking in an animal which otherwise has a subdued purple or brownish coloration. The proboscis may extend out as far as one to one-and-a-half times the shell length. The proboscis is waved around or else moved along the substrate in search of the fish (Plate 4, Figure 2). Often a combination is used. The exact method of location of the fish by the proboscis is unknown as yet, but it appears in some cases as if it were accidental. In no instance observed did the proboscis follow a direct route to the fish.

Once the proboscis tip touches the fish (Plate 4, Figure 3) there is occasionally a slight retraction away from the fish followed by a second contact. On other occasions the initial contact is maintained. The proboscis next begins to move slowly over the body of the fish as the cone apparently attempts by touch to locate a soft area where injection of the radula tooth, which is held in the tip of the proboscis, is assured. With the exception of two instances, in all feeding sequences observed thus far in this study (a total of 20 observations on 4 individuals) the proboscis tip continued to pass over the body of the fish until it reached the ventral abdominal surface. Only when this area had been reached was the radula tooth injected and the proboscis contracted to pull the fish in toward the mouth (Plate 4, Figure 4). This aspect of the feeding sequence occurred with such rapidity it was impossible to separate individual events. Photographs at 1/250 second were blurred (Plate 4, Figure 4).

Of the two instances where injection of the radula tooth was not in the ventral abdominal area, one was an injection just ahead of the caudal fin into the lateral trunk musculature, while the other was, assumedly, into the soft tissue of the mouth of the fish. In this latter case,

the fish observed the moving tip of the proboscis and attacked it, probably as potential prey, taking the tip into the buccal cavity whereupon it was immediately stung. In both of these instances the fish were specimens of *Oligocottus snyderi*.

That the radula tooth is actually injected is certain for I have observed the actual tooth imbedded in a specimen of *Xerperes fucorum* at one end and held in the proboscis of the *Conus* at the other. The radula teeth are very large (6.8 to 7.6mm in one specimen) and thus observable in large dissected specimens of *Conus purpurascens* without optical equipment.

On only one occasion did a fish escape after the injection of the tooth, despite the fact that injection of the tooth invariably caused violent thrashings by the fish. In this instance the fish (*Oligocottus snyderi*) swam straight to the surface of the water and sank immediately back to the bottom where it died in two minutes. It was then consumed by the cone.

When the captured fish has been brought up to the cone via contraction of longitudinal muscles of the proboscis, the muscular mouth surrounding the proboscis expands greatly and engulfs the fish (Plate 4, Figures 5 to 8). This process is usually completed within one minute. When the fish has been thus ingested, the cone begins to burrow into the sand.

Live fish do not seem mandatory for this species as on two occasions when dead *Oligocottus snyderi* were put into the aquarium they were attacked and eaten in exactly the same way as living fishes. However, both of the dead fishes used in these experiments were very fresh. It is not yet known at what time after death *Conus purpurascens* will refuse such fish. This is in contrast to KOHN's (1956) findings for *C. striatus*.

*Conus purpurascens* appears to be a nocturnal feeder as are most of the species of the genus (KOHN, 1959). In several instances, specimens having initiated attacks on fishes in a dimly illuminated room immediately ceased searching and retracted into their shells when bright light, especially daylight, was let into the room. Further study is being continued on this aspect of behavior.

### Explanation of Plate 4

Figure 1: *Conus purpurascens*, siphon out, and a specimen of the fish *Oligocottus snyderi* which has just been placed into the tank

Figure 2: *Conus purpurascens* with proboscis extended actively searching for the fish. The extended proboscis is visible below the fish

Figure 3: The proboscis of *Conus purpurascens* making initial contact with the fin of the *Oligocottus snyderi*

Figure 4: *Conus purpurascens* immediately after injection of the radula tooth into the *Oligocottus snyderi*. The blur is the thrashing fish

Figure 5: *Conus purpurascens* proboscis with impaled fish contracted, expanding its mouth to engulf the fish

Figure 6: *Conus purpurascens* beginning to engulf the captured fish

Figure 7: *Conus purpurascens* with fish almost completely engulfed by the expanded mouth and buccal cavity

Figure 8: *Conus purpurascens* with fish completely engulfed





Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



Figure 7



Figure 8